FORM PTO-1390 (Modified) (REV 11-98) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR
R.35955	09/807922

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE 00/02825	18 AUGUST 2000	23 AUGUST 1999

TITLE OF INVENTION

INJECTOR OF COMPACT DESIGN FOR A COMMON RAIL INJECTION SYSTEM FOR INTERNAL COMBUSTION ENGINES

APPLICANT(S) FOR DO/EO/US

BOECKING, Friedrich

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210).
8. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

Items 13 to 20 below concern document(s) or information included:

13. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ Certificate of Mailing by Express Mail
20. ☒ Other items or information:

Transmittal Sheets In Duplicate W/Fees Charged
To Dep. Acct. 07-2100
Copy Of German Text Application w/2 Sheets Drawings
Translation Of German Text Application w/2 Sheets Drawings
Preliminary Amendment
Copies Of PCT/RO/101, PCT/ISA/210 and 220
Executed Declaration (Not Enclosed)
Assignment to Robert Bosch GmbH (Not Enclosed)

532 Rec'd PCT/PTO 20 APR 2001

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
09/807922	PCT/DE 00/02825	R.35955

21. The following fees are submitted:.

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

		CALCULATIONS PTO USE ONLY
☐	Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2) paid to USPTO and International Search Report not prepared by the EPO or JPO **$1,000.00**	
☒	International preliminary examination fee (37 CFR 1.482) not paid to USPTO but Internation Search Report prepared by the EPO or JPO **$860.00**	
☐	International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$710.00**	
☐	International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) **$690.00**	
☐	International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) **$100.00**	

ENTER APPROPRIATE BASIC FEE AMOUNT =	**$860.00**	
Surcharge of **$130.00** for furnishing the oath or declaration later than ☒ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).	**$130.00**	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	20 - 20 =	0	x $18.00	**$0.00**	
Independent claims	- 3 =	0	x $80.00	**$0.00**	
Multiple Dependent Claims (**check if applicable**).			☐	**$0.00**	
TOTAL OF ABOVE CALCULATIONS =				**$990.00**	
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (**check if applicable**).			☐	**$0.00**	
SUBTOTAL =				**$990.00**	
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)). +				**$0.00**	
TOTAL NATIONAL FEE =				**$990.00**	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (**check if applicable**).			☐	**$0.00**	
TOTAL FEES ENCLOSED =				**$990.00**	
				Amount to be: refunded	$
				charged	$

☐ A check in the amount of to cover the above fees is enclosed.

☒ Please charge my Deposit Account No. **07-2100** in the amount of **$990.00** to cover the above fees.
A duplicate copy of this sheet is enclosed.

☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **07-2100** A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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SIGNATURE

Ronald E. Greigg
NAME

31,517
REGISTRATION NUMBER

20 APRIL 2001
DATE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Friedrich Boecking

Based on PCT/DE 00/02825

For: Injector Of Compact Design For A Common Rail Injection System For Internal Combustion Engines

PRELIMINARY AMENDMENT

Assistant Commissioner of Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE SPECIFICATION

Page 1, between the title and first line of the specification, insert the following:

--Cross-Reference to Related Applications

This application is a 35 USC 371 application of PCT/DE 00/02825 filed on August 18, 2000.

Background of the Invention--;

line 2, delete "Prior Art" and insert --Field of the Invention--;

between lines 10 and 11, insert --Description of the Prior Art--.

Page 2, before line 1, insert --Summary of the Invention--.

Page 5, between lines 3 and 4, insert --Brief Description of the Drawings--;

line 5, delete "the";

delete lines 6-8, and insert --taken with the drawings, in which:--;

line 9, after "Fig. 1" delete ":" and insert --is--;

line 11, after "Fig. 2" delete ":" and insert --is--;

between lines 11 and 12, insert --Description of the Preferred Embodiments--.

Page 6, line 26, delete "22" and insert --21--.

Page 7, line 5, before "cross-sectional" insert --area of the--;

line 18, after "change" insert --area--.

Page 8, line 17, before "manner" insert --known--;

line 26, after "change" insert --area--.

Page 9, line 3, after "face" insert --area--;

line 21, after "It" insert --is--.

Page 10, delete lines 1-4, and insert the following paragraph:

--The foregoing relates to preferred exemplary embodiments of the invention, it being understood that other variants and embodiments thereof are possible within the spirit and scope of the invention, the latter being defined by the appended claims.--.

Page 11, line 1, delete "Claims" and insert --I Claim--.

IN THE CLAIMS

Please cancel claims 1-12 and add new claims 13-32.

13. In an injector for a common rail injection system for internal combustion engines, having a valve control chamber (11), defined by the end face (33) of a

nozzle needle (21), in which the fuel inlet to the control chamber takes place via an inlet throttle (9) and the fuel outlet takes place via an outflow throttle (13), and there is a closing piston (34) in the valve control chamber (11), the improvement wherein the closing piston (34) has a larger diameter than the nozzle needle (21).

14. The injector of claim 13, wherein the closing piston (34) is disposed between the inlet throttle (9) and outflow throttle (13) on one side and the nozzle needle (21) on the other.

15. The injector of claim 13, wherein the closing piston (34) has a first bore (35), extending between its end faces (45, 47).

16. The injector of claim 13, wherein the closing piston (34) has a throttle bore (36) extending between its end faces (45, 47).

17. The injector of claim 13, wherein that a stroke stop (37) is provided in the valve control chamber (11) and limits the displaceability of the closing piston (34) in the direction of the inlet throttle (9) and the outflow throttle (13).

18. The injector of claim 13, wherein a closing spring (40) is present, which is braced against the closing piston (34) and the nozzle needle (21).

19. The injector of claim 18, wherein that the closing spring (40) is disposed in the valve control chamber (11).

20. The injector of claim 18, wherein the closing spring (40) is braced against the end face (33) of the nozzle needle (21).

21. The injector of claim 13, wherein the nozzle needle (21) has a pin (38) protruding in the direction of its longitudinal axis and past its end face (33).

22. The injector of claim 21, wherein the first bore (35) of the closing piston (34) is closable by the pin (38).

23. The injector of claim 22, wherein the first bore (35) of the closing piston (34) has a sealing seat (39) on the face end toward the nozzle needle (21), and the pin (38) has a corresponding sealing cone.

24. The injector of claim 13, wherein the inlet throttle (9) and/or the outflow throttle (13) is disposed in a housing (29) of the injector.

25. The injector of claim 14, wherein the closing piston (34) has a throttle bore (36) extending between its end faces (45, 47).

26. The injector of claim 15, wherein the closing piston (34) has a throttle bore (36) extending between its end faces (45, 47).

27. The injector of claim 13, wherein that a stroke stop (37) is provided in the valve control chamber (11) and limits the displaceability of the closing piston (34) in the direction of the inlet throttle (9) and the outflow throttle (13).

28. The injector of claim 14, wherein a closing spring (40) is present, which is braced against the closing piston (34) and the nozzle needle (21).

29. The invention defined in claim 28, wherein said closing piston (34) has a first bore (35) and a throttle bore (36) extending between its end faces (45, 47).

30. The injector of claim 29, wherein that the closing spring (40) is disposed in the valve control chamber (11).

31. The injector of claim 19, wherein the closing spring (40) is braced against the end face (33) of the nozzle needle (21).

32. The injector of claim 14, wherein the nozzle needle (21) has a pin (38) protruding in the direction of its longitudinal axis and past its end face (33).

IN THE ABSTRACT

Please substitute the attached Abstract of the Disclosure for the abstract as originally filed.

REMARKS

The above amendments are being made to place the application in better condition for examination.

Entry of the amendment is respectfully solicited.

Respectfully submitted,

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Abstract of the Disclosure

A common rail injector is proposed which is very compact in structure and nevertheless brings high closing forces to bear at the end of the injection. This is attained, among other provisions, in that the closing piston has a larger diameter than the nozzle needle.

INJECTOR OF COMPACT DESIGN FOR A COMMON RAIL INJECTION SYSTEM FOR INTERNAL COMBUSTION ENGINES

Prior Art

The invention relates to an injector for a common rail injection system for internal combustion engines, having a valve control chamber, defined by the end face of a nozzle needle, in which the fuel inlet takes place via an inlet throttle and the fuel outlet takes place via an outflow throttle, and there is a closing piston in the valve control chamber.

To reduce the structural length of conventional injectors, various efforts have been made, with the goal of constructing injectors in which the nozzle needle discharges directly into the valve control chamber, and no valve piston is necessary. From European Patent 0 426 205, an injector is known in which the nozzle needle discharges directly into the valve control chamber. Located in the valve control chamber are a control element and a closing piston. A disadvantage of this design is that the closing piston and the control element with an inlet throttle and outflow throttle are disposed in line with one another, so that despite the omission of the valve piston, the structural length of the injector is still comparatively great. Furthermore, the closing forces at the end of injection are relatively slight.

The object of the invention is to furnish an injector that is especially compact in structure and simple in design, and in which the closing forces at the end of injection are high.

According to the invention, this object is attained by an injector for a common rail injection system for internal combustion engines, having a valve control chamber, defined by the end face of a nozzle needle, in which the fuel inlet takes place via an inlet throttle and the fuel outlet takes place via an outflow throttle, and there is a closing piston, which has a greater diameter than the nozzle needle, in the valve control chamber.

This injector has the advantage that its structural length is especially short, since there is only one closing piston in the valve control chamber. Furthermore, in the injector of the invention the closing force at the end of injection is especially high, because the diameter of the closing piston is greater than the diameter of the nozzle needle. Finally, by reducing the number of components of the injector, a simple design of the injector has been achieved.

A variant of the injector of the invention provides that the closing piston is disposed between the inlet throttle and outflow throttle on one side and the nozzle needle on the other, so that the closing piston also takes on control tasks.

In another embodiment, it is provided that the closing piston has a first bore, extending between its end faces, so that the positive displacement work which the nozzle needle must perform upon opening of the injection nozzle counter to the pressure in the valve control chamber is slight.

In an advantageous feature of the invention, the closing piston has a throttle bore extending between its end faces, so that after the end of injection, the closing piston can be returned to its outset position at a defined speed.

In a supplement to the invention, a stroke stop is provided in the valve control chamber and limits the displaceability of the closing piston in the direction of the inlet throttle and the outflow throttle, so that the fuel can flow unhindered into and out of this portion of the valve control chamber.

In a further version, a closing spring is present, which is braced against the closing piston and the nozzle needle, so that after the end of injection the closing piston is moved into its outset position by the spring force.

In an advantageous feature, it is provided that the closing spring is disposed in the valve control chamber, so that a simple design is assured, and the spring force acts directly on the closing piston.

In a supplement to the invention, it is provided that the closing spring is braced against the end face of the nozzle needle, so that the nozzle needle is simple in design.

Another variant provides that the nozzle needle has a pin protruding in the direction of its longitudinal axis and past its end face, so that the portion of the valve control chamber defined by the closing piston and the end face of the nozzle needle does not fail to attain a minimum volume predetermined by the length of the pin. Because of the elasticity of the fuel, this minimum volume brings about a certain elasticity or "softness" of the injector in the valve control chamber and the walls of the valve control chamber.

In another variant of the invention, the first bore of the closing piston is closable by the pin, so that with the injection nozzle open, the pressure in the valve control chamber between the closing piston and the nozzle needle drops no more than necessary, and the leakage losses between the nozzle needle and the valve control chamber are reduced.

In a supplement to the invention, it is provided that the first bore of the closing piston has a sealing seat on the face end toward the nozzle needle, and the pin has a corresponding sealing cone, so that especially good sealing between the pin and the closing piston is achieved.

A variant provides that the inlet throttle and/or the outflow throttle is disposed in a housing of the injector, so that the dimensions of the injector are reduced still further.

Further advantages and advantageous features of the invention can be learned from the ensuing description, the drawing and the claims. One exemplary embodiment of the subject of the invention is shown in the drawing and described in further detail below. Shown are:

Fig. 1: a cross section through an injector according to the invention; and

Fig. 2: an enlarged detail X of Fig. 1.

In Fig. 1, an injector according to the invention is shown. Via a high-pressure connection stub 1, fuel 3 is carried via an inlet conduit 5 to an injection nozzle 7 and via an inlet throttle 9 into a valve control chamber 11. The valve control chamber 11 communicates with a fuel return 17 via an outflow throttle 13, which can be opened by a magnet valve 15. The fuel 3 is shown in Fig. 1 as a black area.

The valve control chamber 11 is defined by a nozzle needle 21. The nozzle needle 21 prevents the fuel 3, which is under pressure, from flowing into the combustion chamber, not shown, between injections. This is achieved by the provision that the nozzle needle 21 is pressed into a nozzle needle seat

22 and seals off the inlet conduit 5 from the combustion chamber, not shown.

The nozzle needle 21 has a cross-sectional change 23 from a larger diameter 25 to a smaller diameter 27. The nozzle needle 21 is guided with its larger diameter 25 in a housing 29. The cross-sectional change 23 defines a pressure chamber 31 of the injection nozzle 7.

In Fig. 2, an enlarged detail X of Fig. 1 of the injector of the invention is shown. In this view it can be seen that the valve control chamber 11 is defined by an end face 33 of the nozzle needle 21. A closing piston 34 is located in the valve control chamber 11 and has a first, larger bore 35 and a second, smaller throttle bore 36. The stroke of the closing piston 34 in the direction of the magnet valve 15 is limited by a stroke stop 37. A pin 38 with a conical tip that fits into a complimentary sealing seat 39 of the closing piston 34 protrudes from the end face 33 of the nozzle needle 21. Fig. 2 shows a state of the injector in which the closing piston 34 rests on the stroke stop 37, and the nozzle needle is seated on its nozzle needle seat 22, not shown in Fig. 2. In this position, there is a gap between the pin 38 and the sealing seat 39 of the closing piston 34, so the fuel 3, not shown in Fig. 2, can flow through the first bore 35 of the closing piston 34 into the part of the valve control chamber 11 located between the closing piston 34 and the nozzle needle 22.

When the outflow throttle 13 is closed, the hydraulic force acting on the end face 33 of the nozzle needle 21 is greater than the hydraulic force acting the cross-sectional change 23, because the end face 33 of the nozzle needle 21 is larger than the annular face of the cross-sectional change 23. If the high-pressure pump, not shown, of the fuel injection system is not driven because the engine is at a stop, then a closing spring 40, acting on the end face 33 of the nozzle needle 21, presses the nozzle needle 21 against the nozzle needle seat 22 shown in Fig. 1 and thus closes the injection nozzle 7 or injector.

When the outflow throttle 13 is opened, which happens when a ball 41 of the magnet valve 15, not described in detail, is lifted from a ball seat 42, the pressure in the valve control chamber 11 drops. As a consequence, the hydraulic force acting on the end face 33 drops as well. As soon as this hydraulic force is less than the hydraulic force acting on the cross-sectional change 23, the nozzle needle 21 moves in the direction of the closing piston 34, until the pin 38 rests on the sealing seat 39. As a result, the injection nozzle 7 shown in Fig. 1 is opened, and the fuel 3 is injected into the combustion chamber. The opening travel of the nozzle needle 21 is represented in Fig. 2 by the nozzle needle stroke "h".

The inlet throttle 9 prevents a complete pressure equalization between the inlet conduit 5 and the valve control

chamber 11. The opening speed of the nozzle needle 21 is determined by the difference in flow between the inlet throttle 9 and the outflow throttle 13.

This indirect triggering of the nozzle needle 21 via a hydraulic force booster system is necessary, because the forces required for rapid opening of the nozzle needle 21 cannot be generated directly with the magnet valve 15. The so-called "control quantity" required in addition to the fuel quantity injected into the combustion chamber reaches the fuel return 17 via the inlet throttle 9, the valve control chamber 11, and the outflow throttle 13. In addition to the control quantity, leakage also occurs at the nozzle needle guide. The control and leakage quantities can amount to up to 50 mm^3 per stroke. They are returned to the fuel tank, not shown, via the magnet valve 15.

To terminate the injection, the outflow throttle 13 is closed by the ball 41 of the magnet valve 15, in a manner not explained in further detail. As a result of the closure of the outflow throttle 13, virtually the same rail pressure builds up again via the inlet throttle 9 in a portion 43 of the valve control chamber 11 that is defined by the closing piston 34 and the outflow throttle 13. This pressure exerts a hydraulic force on the nozzle needle 21 via the end face 45 of the closing piston 34 and via the pin 38 resting on the sealing seat 39. As soon as this hydraulic force exceeds the hydraulic force acting on the cross-sectional change 23, the

nozzle needle 21 closes. Because the end face 45 of the closing piston is markedly larger in comparison to the annular face of the cross-sectional change 23, the closing motion takes place very fast and with great force. Simultaneously with the closing motion, a small portion of the fuel, flowing into the portion 43 of the valve control chamber 11, flows through the throttle bore 36 into the valve control chamber 11 defined by the closing piston 34 and by the end face 33 of the nozzle needle 21. The closing motion takes place so fast that before a pressure equalization is reached, the nozzle needle 21 rests on the nozzle needle seat 22 again, and the injection is terminated. The closing speed of the nozzle needle 21 is determined essentially by the flow through the inlet throttle 9.

In order for the closing piston 34 to move to the outset position against the stroke stop 37 after the end of injection, the portion of the valve control chamber 11 defined by the closing piston 34 and the end face 33 of the nozzle needle 21 is filled with fuel through the throttle bore 36, while the closing spring 40 presses the closing piston 34 upward. It also conceivable to omit the throttle bore 36 and to dimension the play of the closing piston 34 in the housing 29 in such a way that the fuel flows through the annular gap between the closing piston 34 and the housing 29. The second end face 47 of the closing piston 34 can also, as shown in Fig. 2, have a shoulder, which serves for instance to guide the closing spring 40.

All the characteristics found in the description, the ensuing claims and the drawing can be essential to the invention both individually and in arbitrary combination with one another.

Claims

1. An injector for a common rail injection system for internal combustion engines, having a valve control chamber (11), defined by the end face (33) of a nozzle needle (21), in which the fuel inlet takes place via an inlet throttle (9) and the fuel outlet takes place via an outflow throttle (13), and there is a closing piston (34) in the valve control chamber (11), characterized in that the closing piston (34) has a larger diameter than the nozzle needle (21).

2. The injector of claim 1 or 2, characterized in that the closing piston (34) is disposed between the inlet throttle (9) and outflow throttle (13) on one side and the nozzle needle (21) on the other.

3. The injector of claim 1, characterized in that the closing piston (34) has a first bore (35), extending between its end faces (45, 47).

4. The injector of one of the foregoing claims, characterized in that the closing piston (34) has a throttle bore extending between its end faces (45).

5. The injector of one of the foregoing claims, characterized in that a stroke stop (37) is provided in the valve control

chamber (11) and limits the displaceability of the closing piston (34) in the direction of the inlet throttle (9) and the outflow throttle (13).

6. The injector of one of the foregoing claims, characterized in that a closing spring (40) is present, which is braced against the closing piston (34) and the nozzle needle (21).

7. The injector of claim 6, characterized in that the closing spring (40) is disposed in the valve control chamber (11).

8. The injector of claim 6 or 7, characterized in that the closing spring (40) is braced against the end face (33) of the nozzle needle (21).

9. The injector of one of the foregoing claims, characterized in that the nozzle needle (21) has a pin (38) protruding in the direction of its longitudinal axis and past its end face (33).

10. The injector of claim 9, characterized in that the first bore (35) of the closing piston (34) is closable by the pin (38).

11. The injector of claim 10, characterized in that the first bore (35) of the closing piston (34) has a sealing seat (39) on the face end toward the nozzle needle (21), and the pin (38) has a corresponding sealing cone.

12. The injector of one of the foregoing claims, characterized in that the inlet throttle (9) and/or the outflow throttle (13) is disposed in a housing (29) of the injector.

Abstract

A common rail injector is proposed which is very compact in structure and nevertheless brings high closing forces to bear at the end of the injection. This is attained, among other provisions, in that the closing piston (34) has a larger diameter than the nozzle needle (21). (Fig. 2)

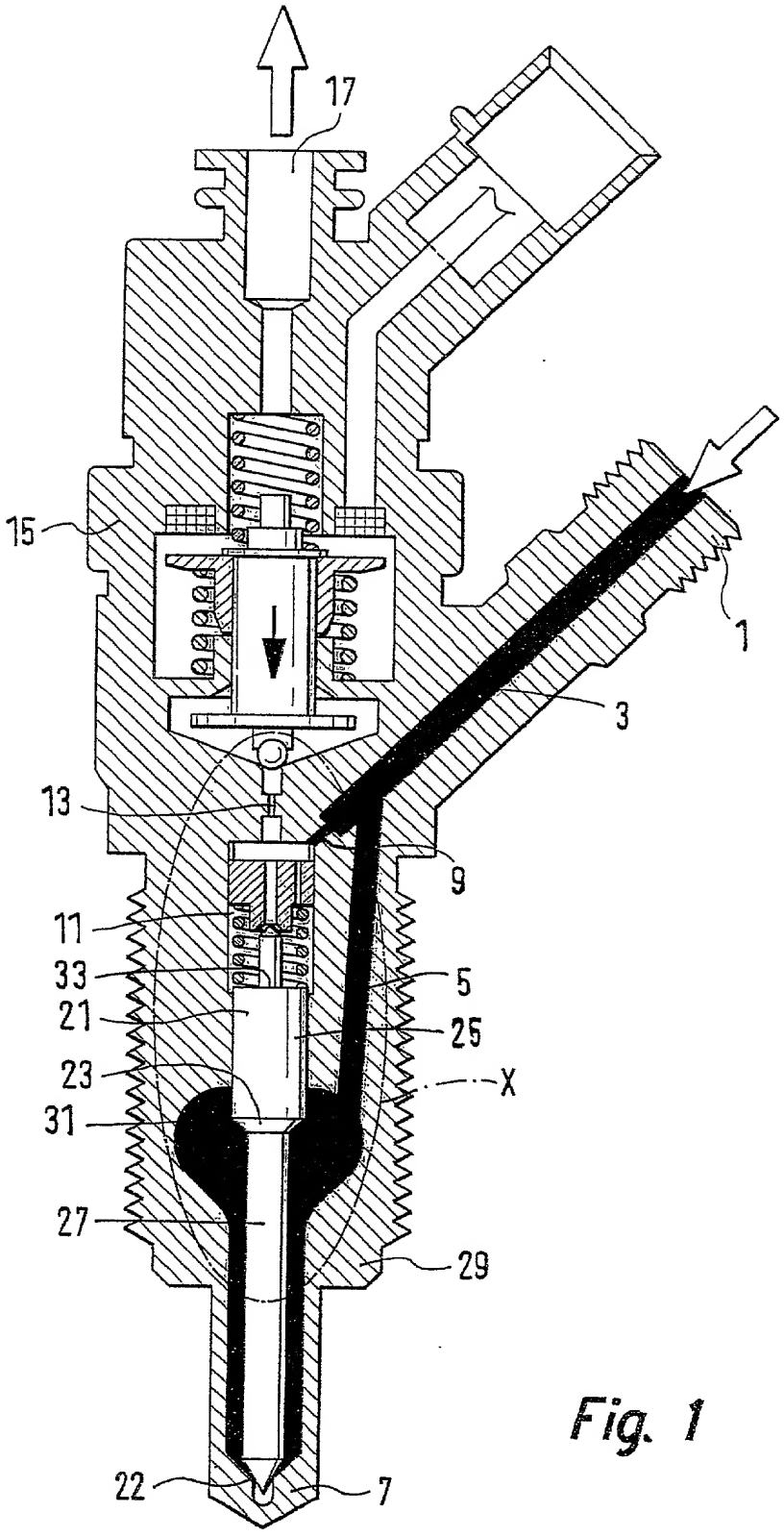

Fig. 1

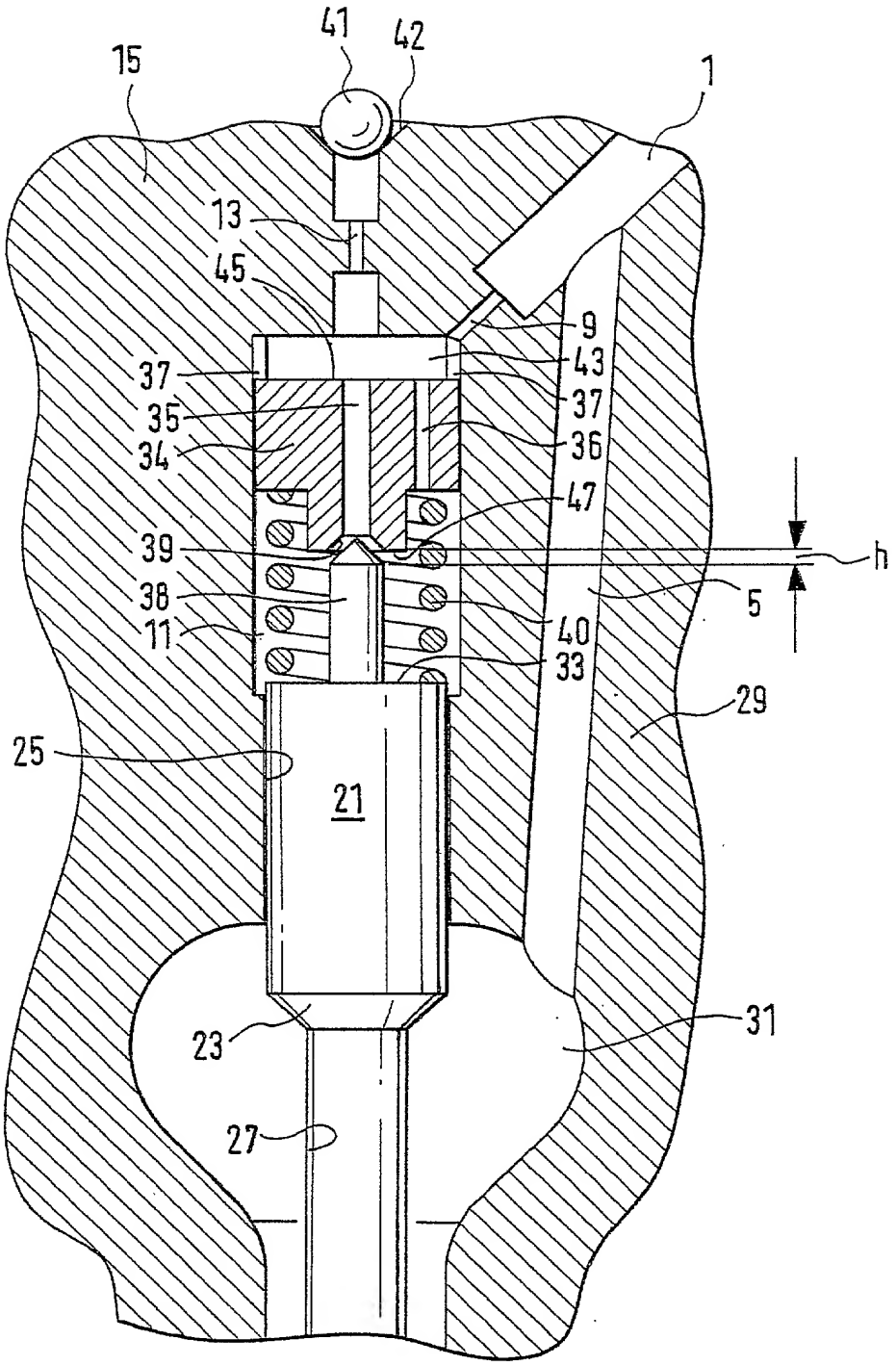
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Fig. 2

Docket No.
R.35955

Declaration and Power of Attorney For Patent Application

English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

INJECTOR OF COMPACT DESIGN FOR A COMMON RAIL INJECTION SYSTEM FOR INTERNAL COMBUSTION ENGINES

the specification of which

(check one)

- ☐ is attached hereto.
- ☒ was filed on 18 AUGUST 2000 as United States Application No. or PCT International Application Number PCT/DE 00/02825
- and was amended on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Claimed	
1 99 39 939.5	GERMANY	23 AUGUST 1999	X	☐
(Number)	(Country)	(Day/Month/Year Filed)		
(Number)	(Country)	(Day/Month/Year Filed)		☐
(Number)	(Country)	(Day/Month/Year Filed)		☐

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

(Application Serial No.)	(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

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